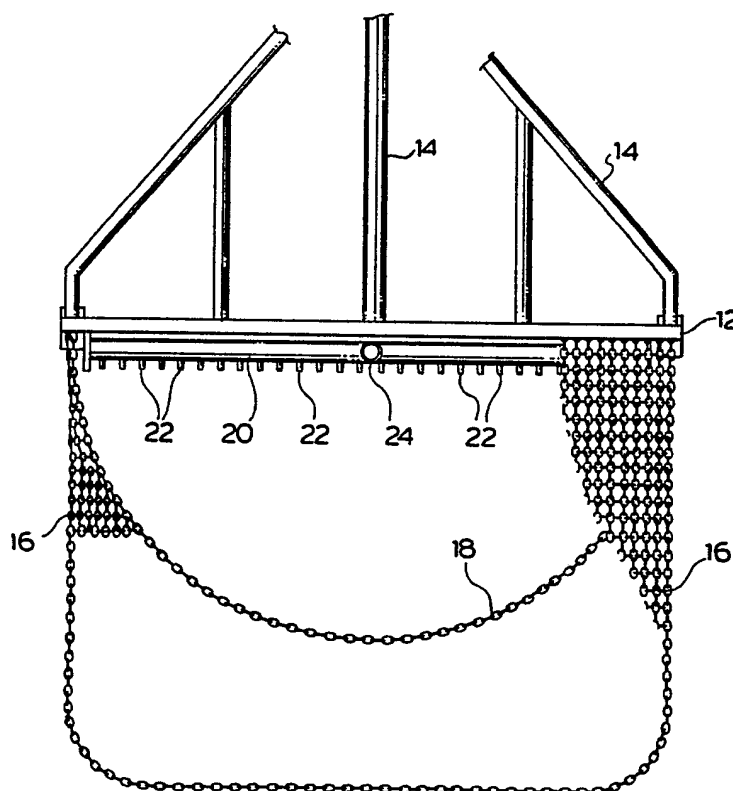


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(54) Title: SCALLOP FISHING EQUIPMENT**(57) Abstract**

Scallop fishing apparatus has water jets (22) which cause stationary scallops to be lifted from the ocean bottom into the path of the open mouth of the collecting bag (16) so as to be caught thereby as the equipment is dragged along an ocean bottom. Such jets (72) may be provided by nozzles mounted on a transverse manifold pipe (20) carried by the frame (14) and supplied with water under pressure by a pump mounted on the towing vessel or the frame and appropriately connected to the manifold (20).



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SCALLOP FISHING EQUIPMENT

This invention relates to scallop fishing equipment.

Scallops, like clams, are bivalve molluscs. However, scallops can swim by opening and closing the valves, whereas clams cannot. Usually, when at rest, scallops simply rest on the bottom on a body of water (hereinafter generally referred to as an ocean), and may be in shallow depressions if the bottom of the ocean is soft. On the other hand, clams generally tend to be found buried or partly buried in sand or mud at the bottom of an ocean.

In the past, fishing for scallops has usually been carried out with equipment comprising a collecting bag whose mouth is attached to a rectangular frame to hold the mouth of the bag open, and a towing bridle attached to and extending forwardly of the frame for connection to a tow line, generally known as a towing warp. There are two principal ways of causing scallops to enter the collecting bag as the equipment is dragged along an ocean bottom. The scallops may be swept up into the bag by a sweep chain which forms the lower leading edge of the bag at its open end, or may be physically guided up and over the lower part of the frame and into the mouth of the bag by suitably angled teeth on the front of the lower part of the frame, i.e. a toothed rake technique.

Although the toothed rake technique is more

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efficient, such equipment is only practical where the ocean bottom is smooth soft sand or mud free of rocks. This is usually not the case in the off-shore fishing areas of Canada and the United States of America, where most ocean bottoms comprise hard packed sand, a sand/gravel composite and/or rocks of varying sizes. Such hard bottoms cause the teeth to be broken off. With such hard bottoms therefore, it is usual to use the less efficient sweep equipment.

Unfortunately, both types of equipment cause unacceptably high destruction of uncaught scallops, namely as a result of the collecting bag being dragged over uncaught scallops. This is particularly serious because the usual practice is to make several passes over the same area, i.e. to drag the equipment several times along the same stretch of ocean floor, to increase the catch from the area concerned.

There is therefore a need for improved scallop fishing equipment of the sweep kind which catches scallops more efficiently than known equipment of this kind.

According to the present invention, water jets are used to cause stationary scallops to be lifted from the ocean bottom into the path of the open mouth of the collecting bag so as to be caught thereby as the equipment is dragged along an ocean bottom. Such jets may be provided by nozzles mounted on a transverse manifold pipe carried by the frame and supplied with water under pressure by a pump mounted on the towing vessel or the

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frame and appropriately connected to the manifold. Advantageously, the water jets form a diffuse spray.

The invention substantially increases the efficiency of the sweep chain type of scallop fishing equipment. This type of equipment can therefore be used efficiently with soft as well as hard ocean bottoms. There is less destruction of uncaught scallops because more scallops are caught in a single pass over a given area. Also, fewer passes are required to catch the same number of scallops compared to prior art equipment.

The present invention is substantially different from known hydraulic dredging equipment which is used to catch clams. As mentioned earlier, clams are buried or partly buried in sand or mud, and the hydraulic dredging equipment is used to dig clams out of the ocean bottom with the aid of water jets and a carrier ramp assembly set to travel at a depth of several inches below the ocean bottom to scoop up clams from a trough created by the water jets. This is in contrast to the present invention in which water jets are used to cause scallops to be lifted upwardly from the ocean bed so as to pass into the mouth of the collecting bag.

One embodiment of the invention will now be described, by way of example, with reference to the accompanying drawings, of which: -

Figure 1 is a diagrammatic plan view of scallop fishing equipment in accordance with the invention, and

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Figure 2 is a diagrammatic side view of the equipment showing how scallops are caught as the equipment is dragged along an ocean bottom.

Referring to the drawings, scallop fishing equipment includes an upright rectangular open frame 12 with a towing bridle 14 secured to the front thereof. The chain-link bag 16 has its open end secured to the periphery of the frame 12, which accordingly maintains the bag 16 in an open configuration. When dragged along an ocean bottom, the lower edge portion 18 of the open end of the bag 16 assumes a rearwardly-extending forwardly concavely curved configuration, as indicated in Figure 1.

As so far described, the scallop fishing equipment is conventional. In use, the equipment is dragged along an ocean bottom by a towing vessel so that some of the scallops on the ocean bottom pass over the lower front edge portion 18 of the bag 16 and are therefore caught. Some scallops may also be caught "in flight" while they are in motion above the ocean bottom and in the path of the open mouth of the bag 16. As indicated earlier, the frame 12 and bag 16 will pass over and probably damage or kill many uncaught scallops.

In accordance with the invention, a manifold pipe 20 is secured transversely across the frame 12 at a position slightly below mid-height level of the frame 12. A series of rearwardly and downwardly connected nozzles 22 are fitted to the manifold pipe 20, and an inlet pipe 24

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is secured to the manifold pipe 20 midway along its length.

In use, as the equipment is dragged along an ocean bottom 26, water under pressure is supplied from a pump on the towing vessel (or on the equipment itself) to the inlet pipe 24 and manifold 20 to cause jets of water to issue from the nozzles 22. The nozzles 22 are angled to cause the water jets to impinge on the ocean bottom 26 in front of the lower front edge portion 18 of the bag 16 so as to force scallops off the ocean bottom into or at least into the path of the open end of the bag 16. Figure 2 shows a scallop 28 being forced off the ocean bottom 26 by a jet of water from a nozzle 22 into the path of the bag 16.

Since the water jets in accordance with the invention enable more scallops to be caught per pass of the equipment over a given area of ocean bottom than is the case with previously known equipment of the sweep chain type, there are fewer uncaught scallops to be damaged by passage of the equipment over them. Also, as mentioned earlier, damage to uncaught scallops is also lessened because fewer passes are required to catch a desired percentage of scallops in the area.

Some times, a scallop will sense the approach of the equipment and will attempt to "swim" away. Such scallops will probably remain in the path of the open end of the bag 16 and therefore be caught, as indicated in Figure 2 by scallops 30. This also applies of course to

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prior art equipment of the sweep chain kind.

The nozzle 22 may advantageously be arranged to cause the water jets to form a diffuse spray. It has been found that a water pressure in the range of 40 to 60 psi is suitable for this purpose.

Other embodiments and advantages of the invention will be readily apparent to a person skilled in the art.

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I claim:

1. An apparatus for scallop fishing comprising:
 - a frame for towing behind a vessel;
 - a bag connected to the frame for receiving scallops, having a mouth wherein part of the mouth is adapted for dragging along an ocean floor and behind the frame and the remainder of the mouth is adapted to maintain the bag open above the ocean floor;
 - water jets for applying a water spray to disturb the ocean floor ahead of the bag opening; and
 - pump means for delivering water under pressure to the water jets.
2. An apparatus as claimed in claim 1 wherein the water jets comprise a manifold mounted substantially horizontally onto the frame and having a plurality of downwardly and rearwardly directed nozzles.
3. An apparatus as claimed in claim 2 wherein the nozzles are adapted to produce a diffuse spray.
4. An apparatus as claimed in claim 3 wherein the pump means comprises a pump mounted on the vessel having a high pressure exhaust connected to a pressure hose connected to the manifold.
5. An apparatus as claimed in claim 4 wherein the frame has a first end for receiving a tow means and extends substantially horizontal and a second end having an inverted U-shaped member extending upwardly for receiving the bag.

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6. An apparatus is claimed in claim 5 wherein the perimeter of the bag mouth exceeds the length of the U-shaped member and the remainder of the bag mouth is joined to the U-shaped member.

7. An apparatus as claimed in claim 6 wherein the pump delivers water in the range of 40 to 60 pounds per square inch.

8. An apparatus as claimed in claim 7 wherein the bag is made from a chain link material.

9. An apparatus as claimed in claim 5 wherein the tow means is a length of rope connected between the vessel and the frame.

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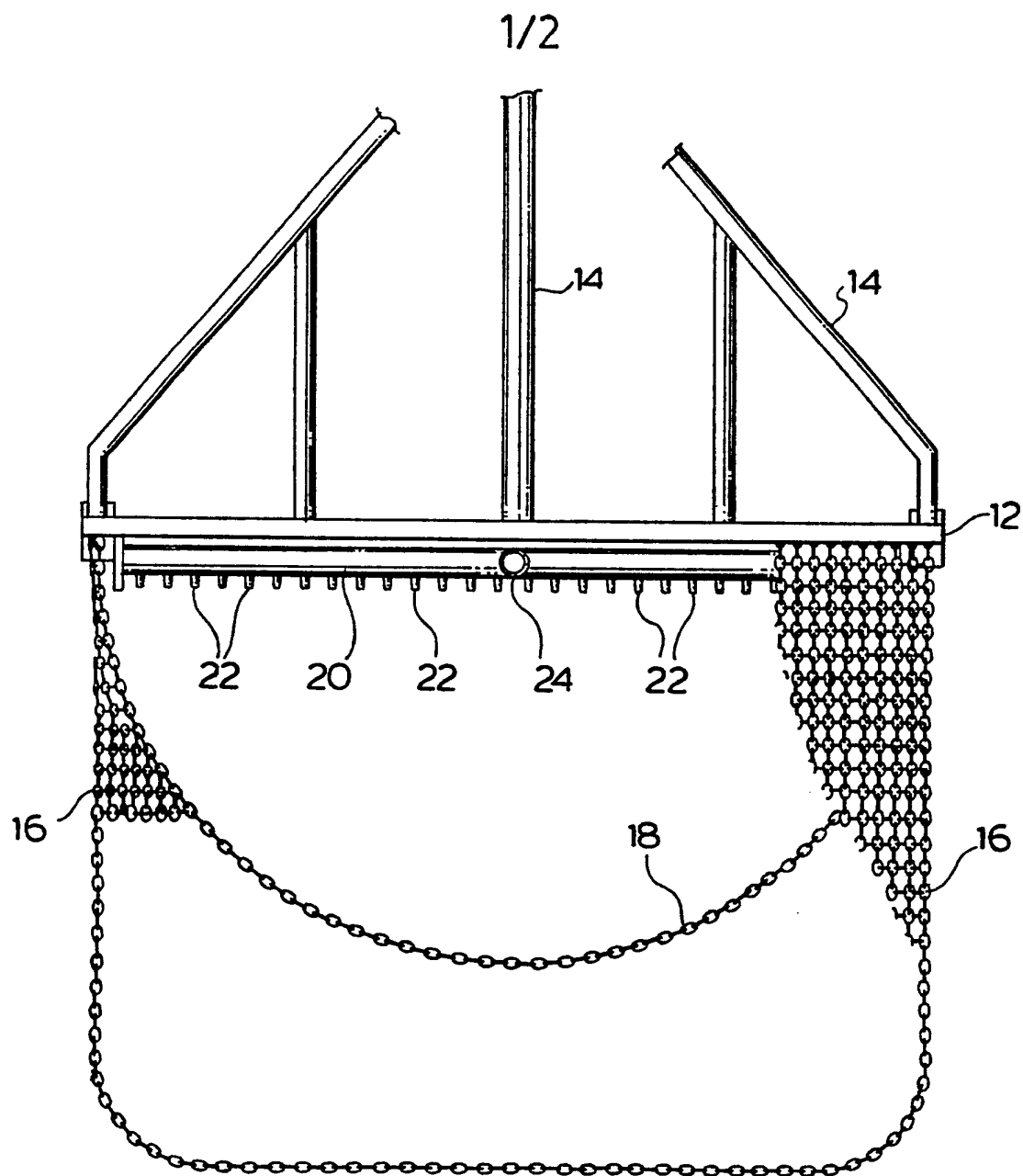
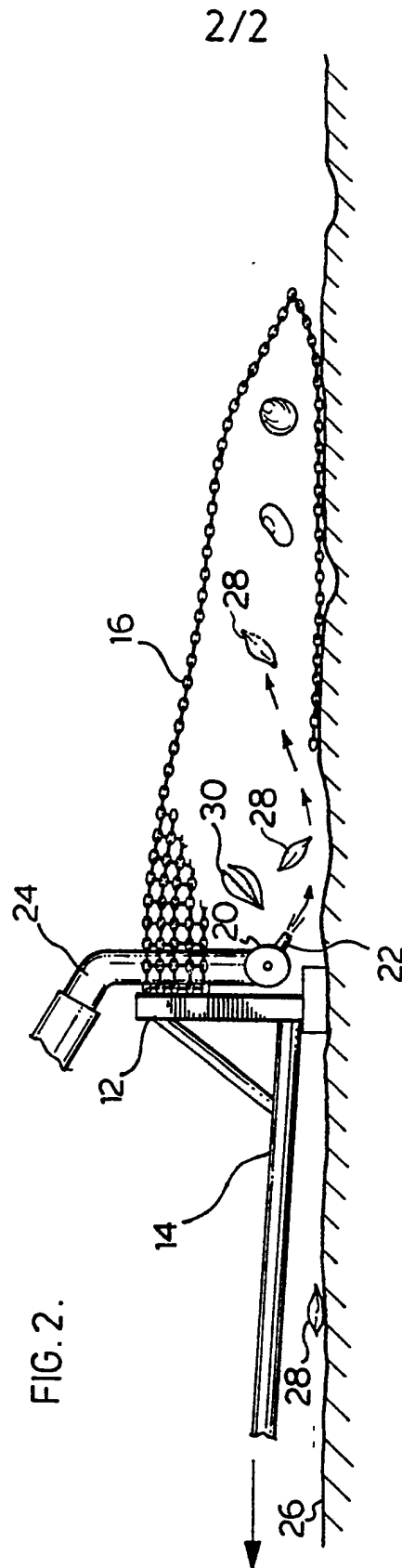


FIG.1.

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INTERNATIONAL SEARCH REPORT

International Application No

PCT/CA 90/00278

I. CLASSIFICATION OF SUBJECT MATTER (if several classification symbols apply, indicate all) ⁶		
According to International Patent Classification (IPC) or to both National Classification and IPC Int.Cl. 5 A01K80/00		
II. FIELDS SEARCHED		
Minimum Documentation Searched ⁷		
Classification System	Classification Symbols	
Int.Cl. 5	A01K	
Documentation Searched other than Minimum Documentation to the Extent that such Documents are Included in the Fields Searched ⁸		
III. DOCUMENTS CONSIDERED TO BE RELEVANT ⁹		
Category ¹⁰	Citation of Document, ¹¹ with indication, where appropriate, of the relevant passages ¹²	Relevant to Claim No. ¹³
X	WORLD FISHING. vol. 14, no. 12, 01 December 1965, LONDON GB page 77 W.F. RESEARCH: "NEW HOPE FOR COCKLINGS?" see page 77	1-5, 7-8
X	--- US,A,3862502 (YOUNG) 28 January 1975 see column 2, line 22 - column 4, line 3; figures 1-4	1
A	---	2, 4, 5, 7, 9
A	FR,A,1591299 (BORDEN, INC.) 27 April 1970 see page 3, lines 7 - 12; figures 1, 3	1-4
A	--- NL,A,8403029 (VAN ZUYDAM) 01 May 1986 see claim 1; figures 1A, 1B ---	1, 6
-/--		
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IV. CERTIFICATION		
Date of the Actual Completion of the International Search	Date of Mailing of this International Search Report	
03 DECEMBER 1990	19 DEC 1990	
International Searching Authority	Signature of Authorized Officer	
EUROPEAN PATENT OFFICE	VON ARX V.U.	

III. DOCUMENTS CONSIDERED TO BE RELEVANT (CONTINUED FROM THE SECOND SHEET)		
Category ^a	Citation of Document, with indication, where appropriate, of the relevant passages	Relevant to Claim No.
A	TECHNOLOGICAL DIGESTS vol. 9, no. 3, 01 March 1964, I.T.D. CANADA pages 85 - 86; ANON.: "HYDRAULIC CLAM DIGGER BRINGS EFFICIENCY TO CLAM HARVESTING" ---	

ANNEX TO THE INTERNATIONAL SEARCH REPORT
ON INTERNATIONAL PATENT APPLICATION NO.

PCT/CA 90/00.
SA 39732

This annex lists the patent family members relating to the patent documents cited in the above-mentioned international search report.
The members are as contained in the European Patent Office FDP file on

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Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US-A-3862502	28-01-75	None	
FR-A-1591299	27-04-70	GB-A- 1207906	07-10-70
NL-A-8403029	01-05-86	None	

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DOCUMENT-IDENTIFIER: WO 9103158 A1
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PUBN-DATE: March 21, 1991

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INT-CL (IPC): A01K080/00

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ABSTRACT:

Scallop fishing apparatus has water jets (22) which cause stationary scallops to be lifted from the ocean bottom into the path of the open mouth

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